FIG. 1 prior art

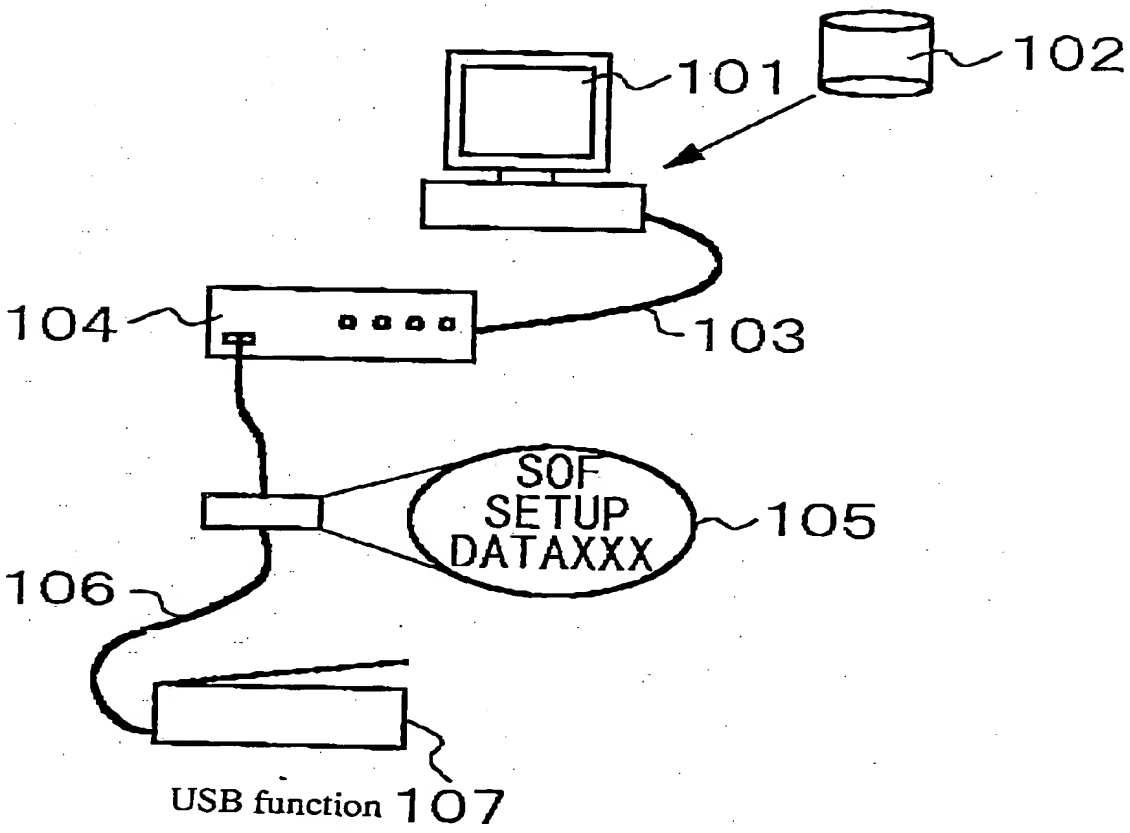


FIG. 2 prior art

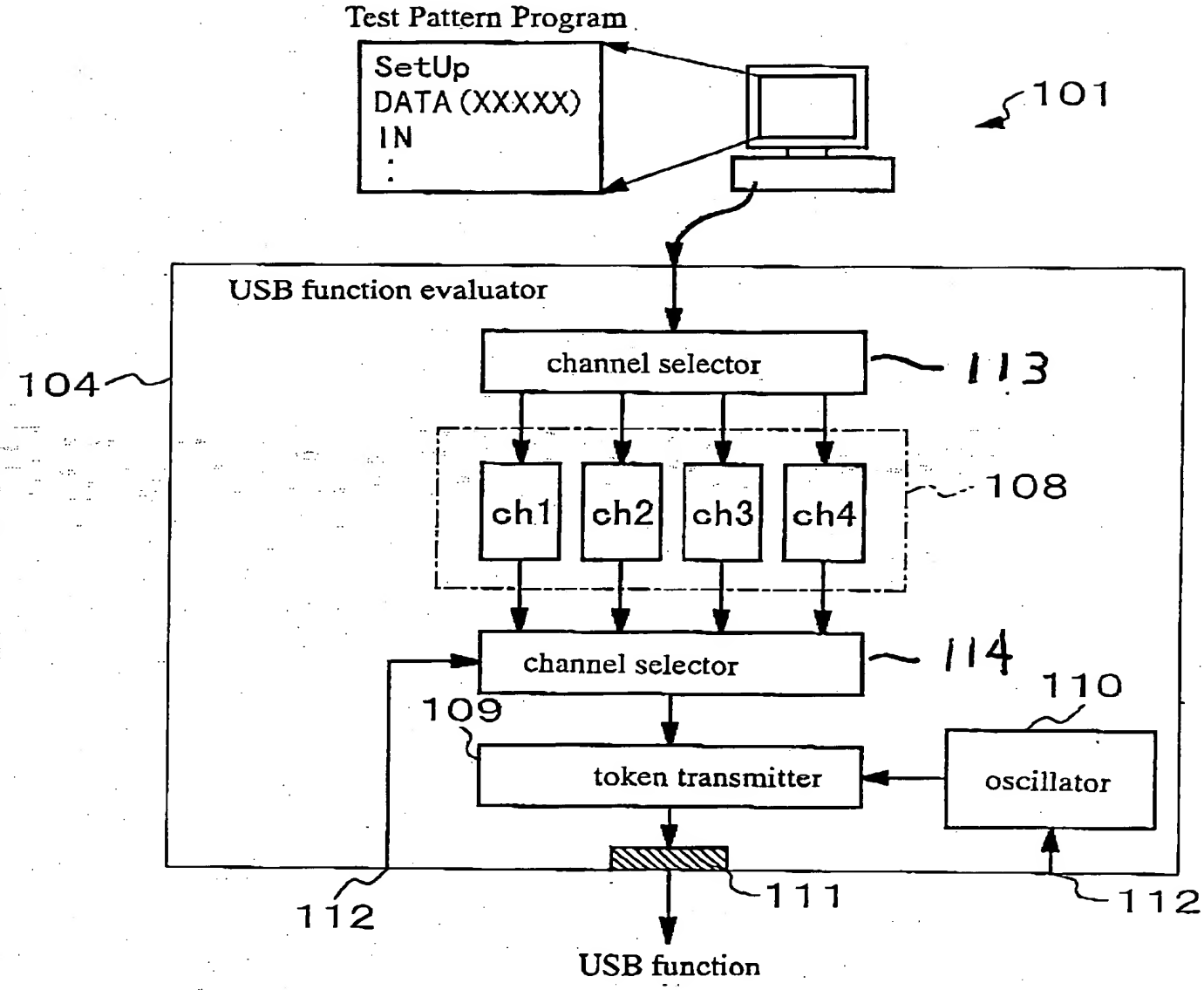


FIG. 3 prior art

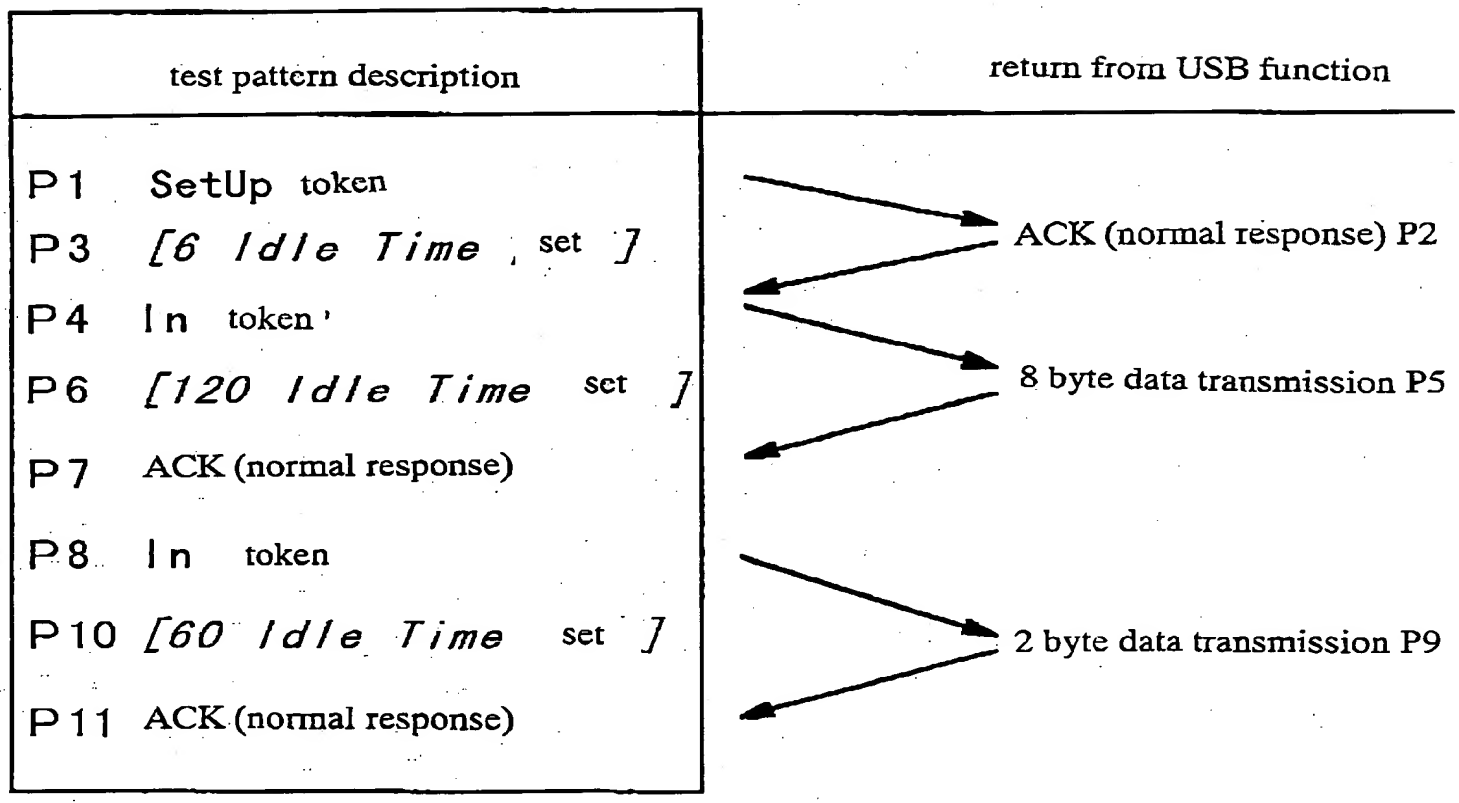


FIG. 4 prior art

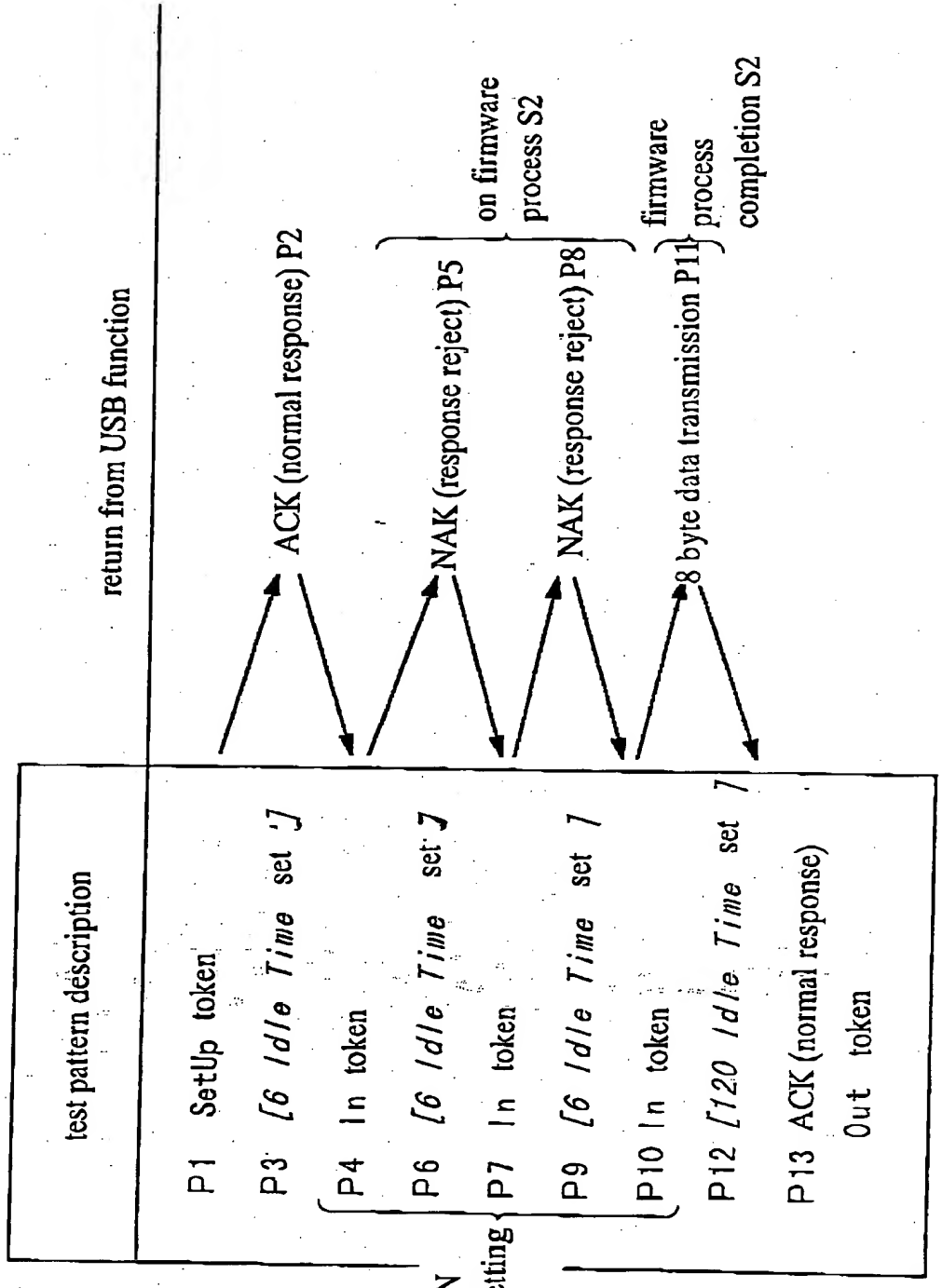
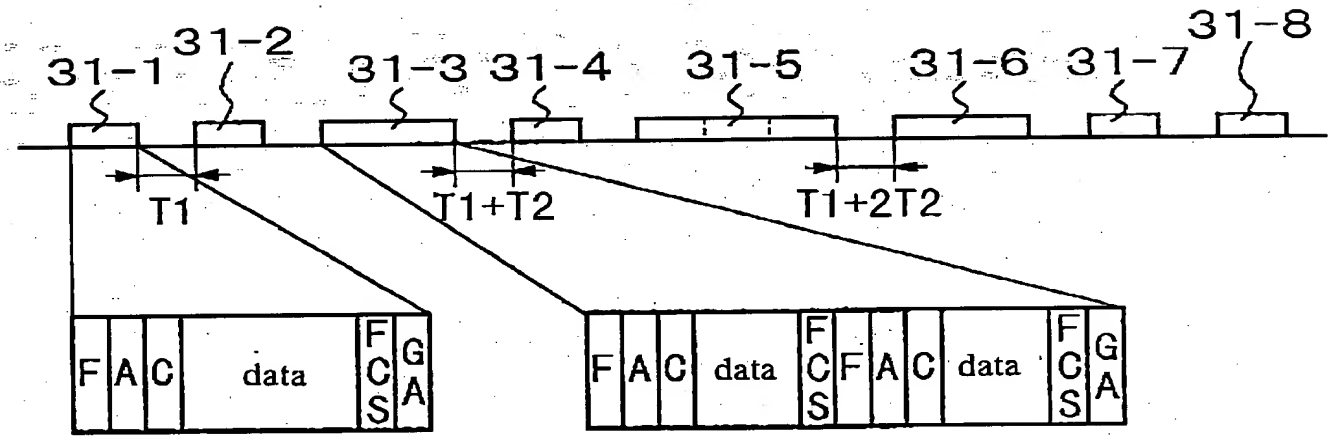


FIG. 5 prior art



F : flag
A : address
C : commend
FCS : frame check code
GA : termination code

FIG. 6 prior art

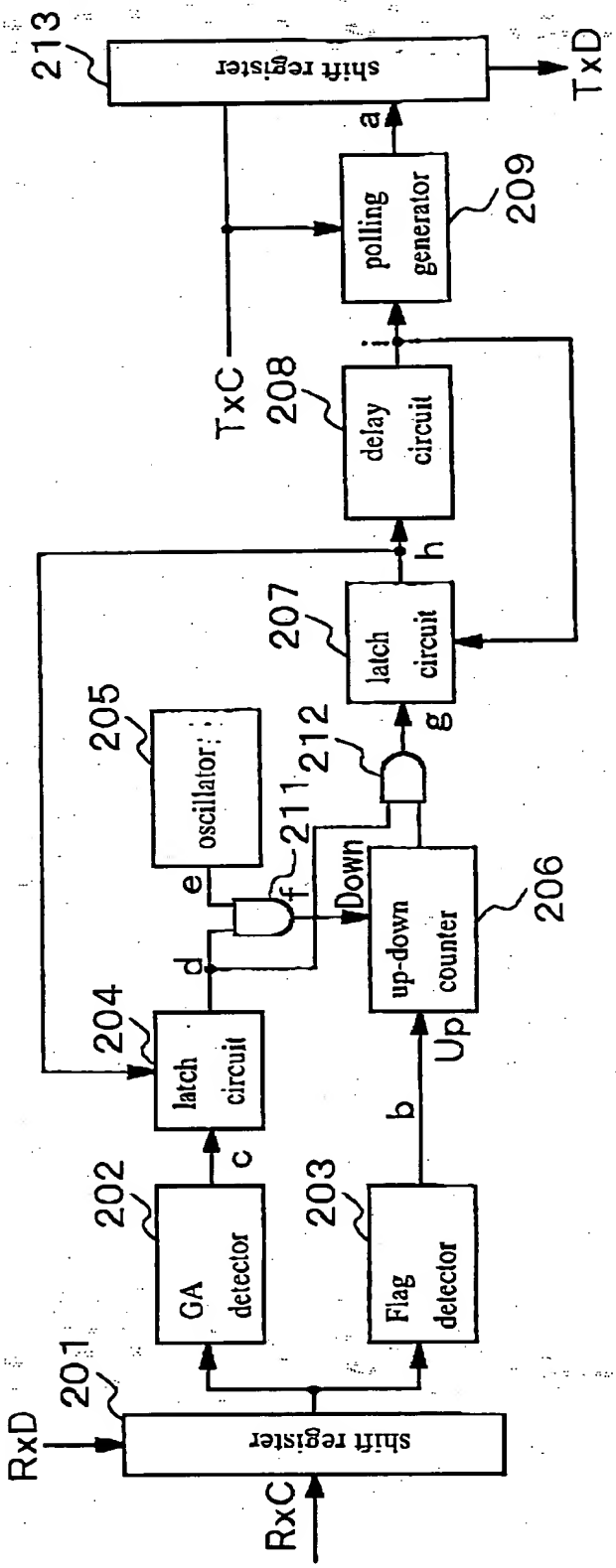
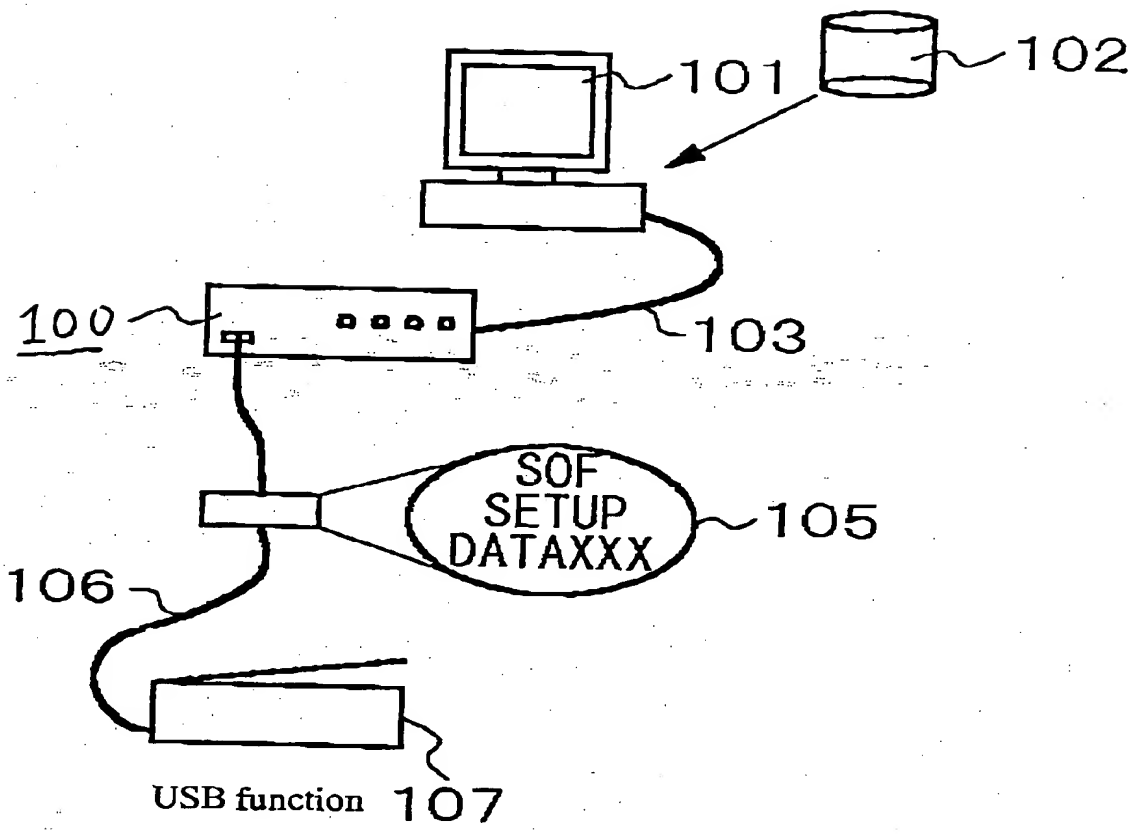


FIG. 7



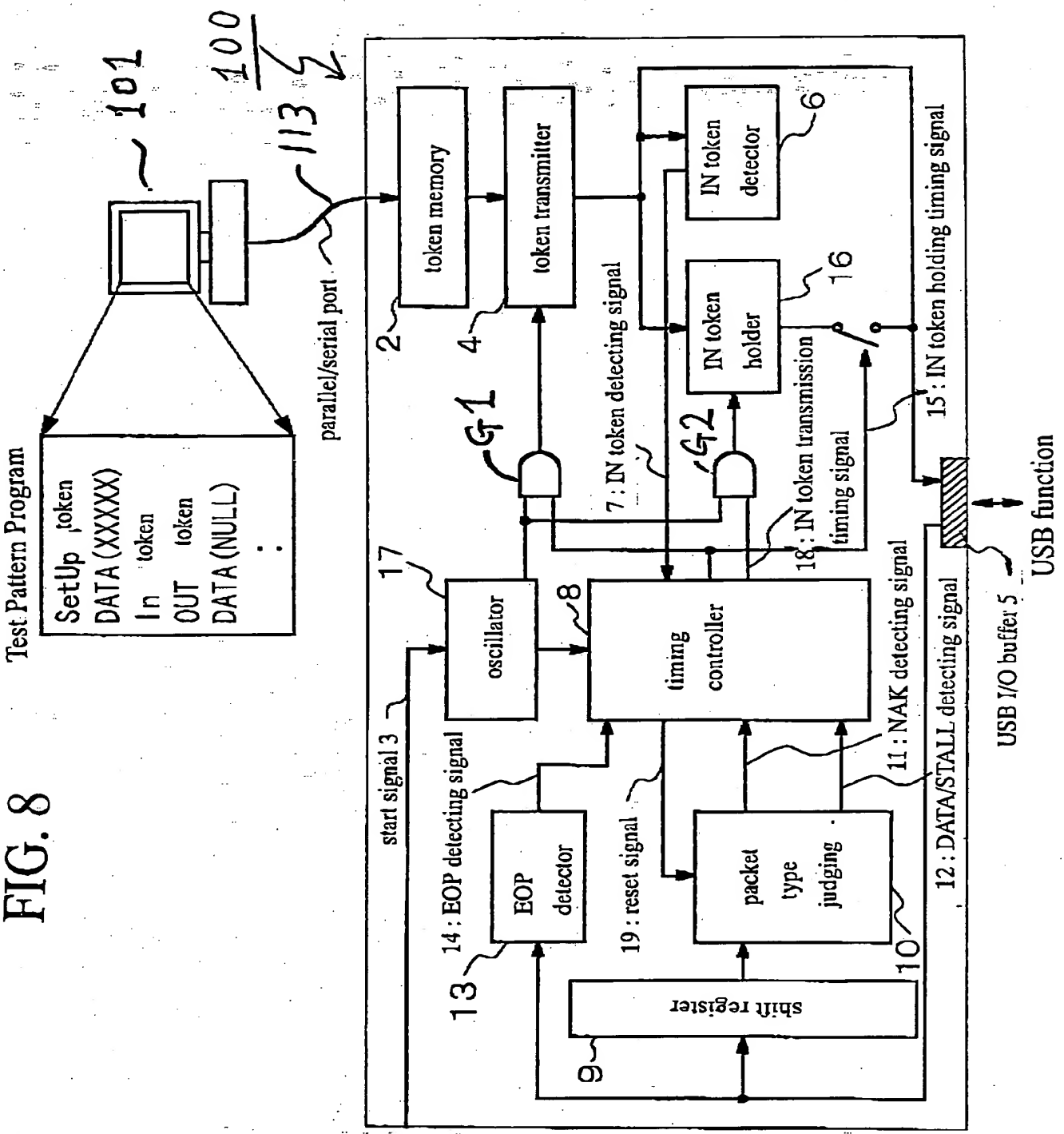

100
101
113
Test Pattern Program
SetUp token
DATA (XXXXX)
In token
OUT token
DATA (NULL)
:
parallel/serial port
token memory
token transmitter
IN token detector
IN token holder
16
2
4
6
G1
G2
7 : IN token detecting signal
18 : IN token transmission timing signal
15 : IN token holding timing signal
17
oscillator
8
timing controller
start signal 3
14 : EOP detecting signal
EOP detector
13
19 : reset signal
packet type judging
10
11 : NAK detecting signal
12 : DATA/STALL detecting signal
shift register
9
USB I/O buffer 5
USB function

FIG. 8

FIG. 9

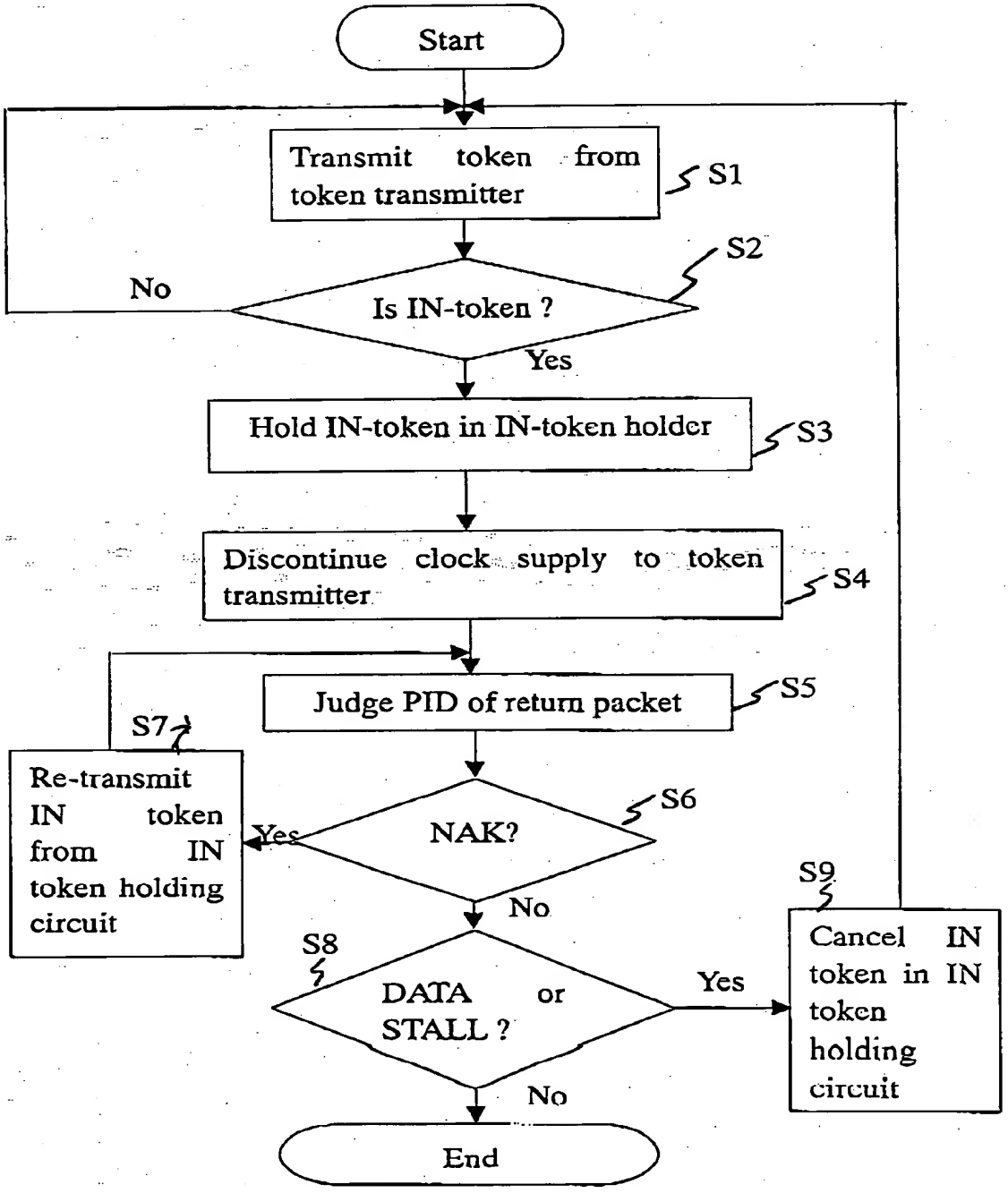

Start
Transmit token from token transmitter
S1
Is IN-token ?
S2
No
Yes
Hold IN-token in IN-token holder
S3
Discontinue clock supply to token transmitter
S4
Judge PID of return packet
S5
NAK?
S6
Yes
No
Re-transmit IN token from IN token holding circuit
S7
DATA or STALL ?
S8
Yes
No
Cancel IN token in IN token holding circuit
S9
End

FIG. 10

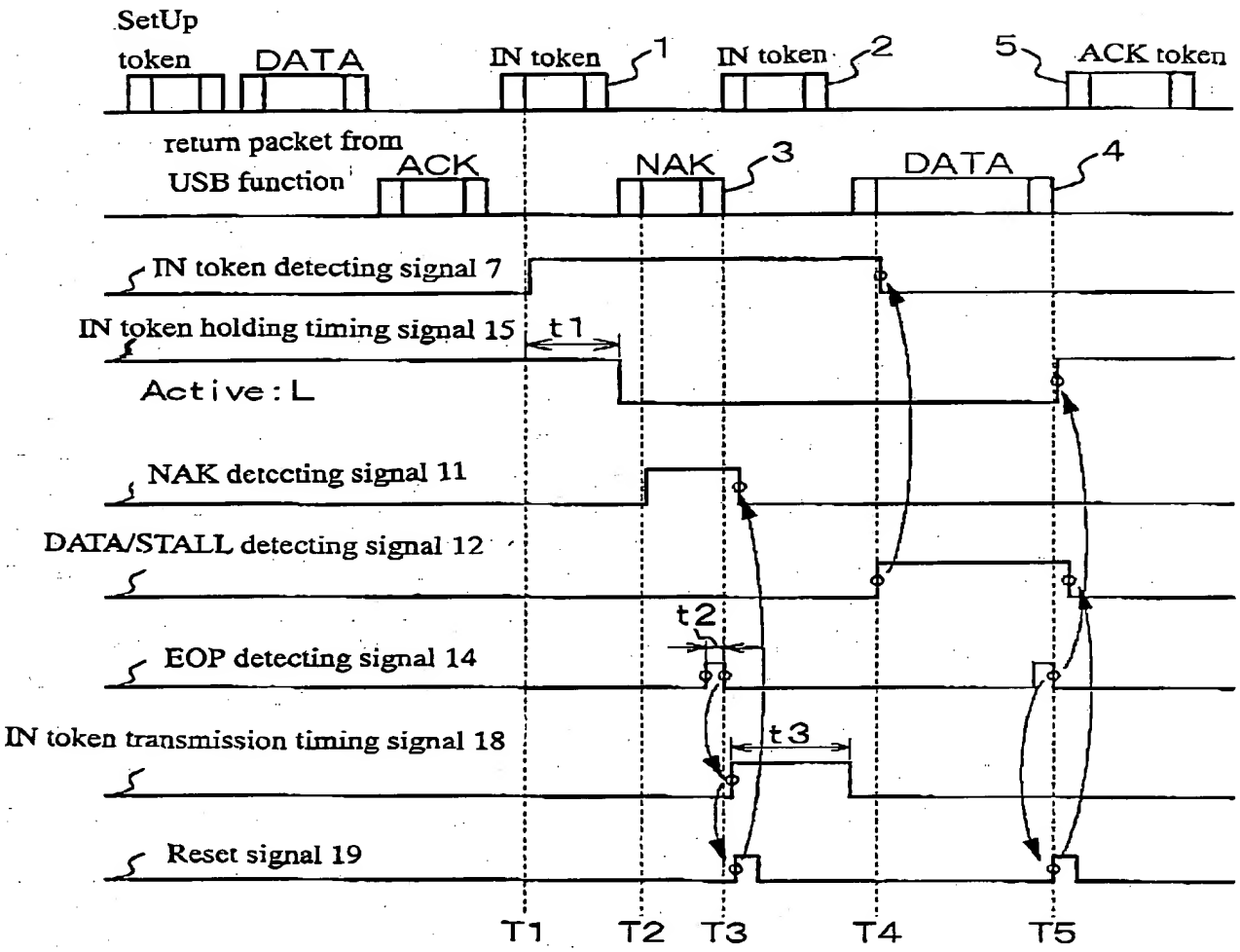

SetUp token
DATA
IN token
1
IN token
2
5
ACK token
return packet from USB function
ACK
NAK
3
DATA
4
IN token detecting signal 7
IN token holding timing signal 15
t1
Active : L
NAK detecting signal 11
DATA/STALL detecting signal 12
t2
EOP detecting signal 14
IN token transmission timing signal 18
t3
Reset signal 19
T1
T2
T3
T4
T5

FIG. 11

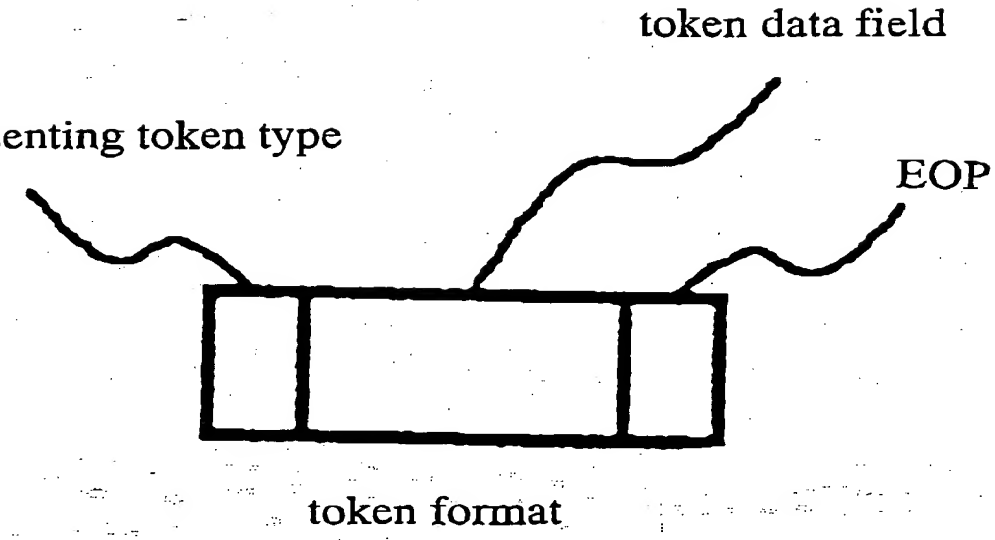
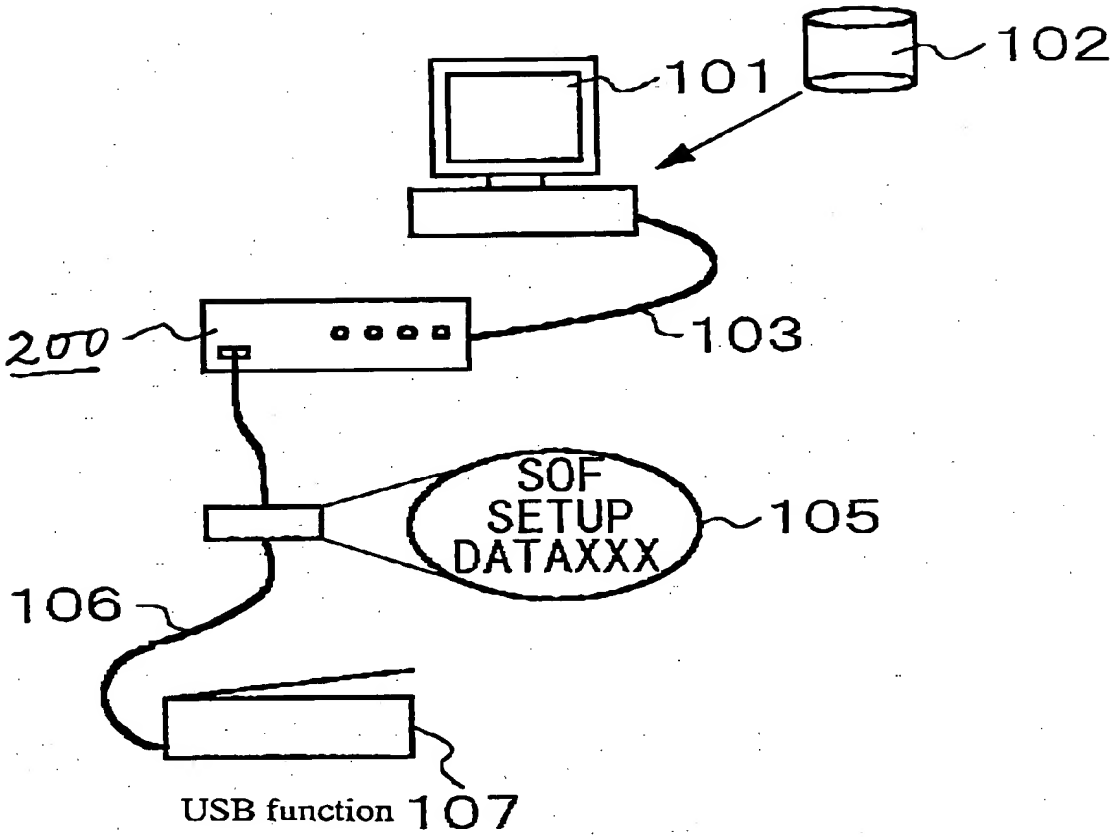

token data field
filed representing token type
EOP
token format

FIG. 12



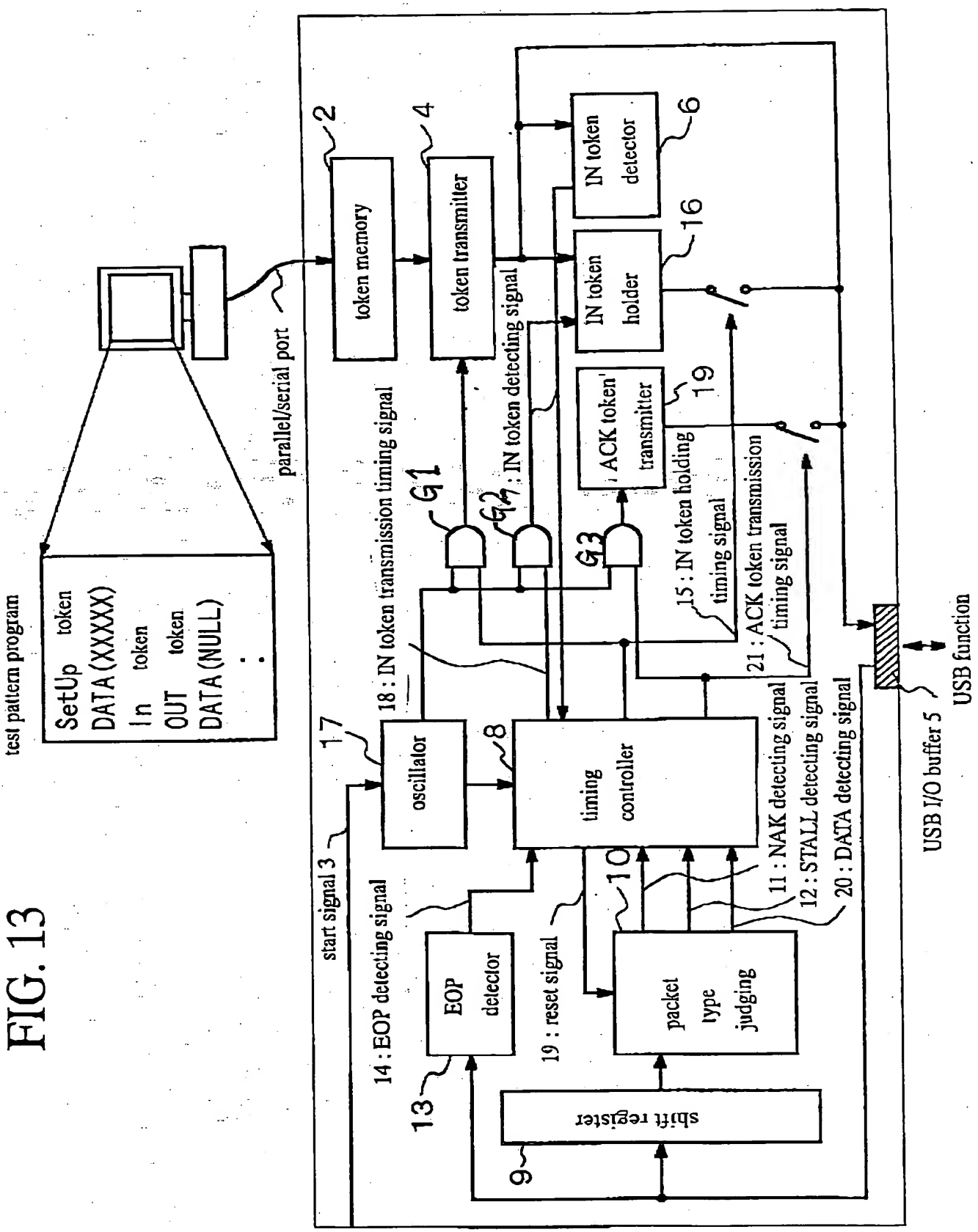
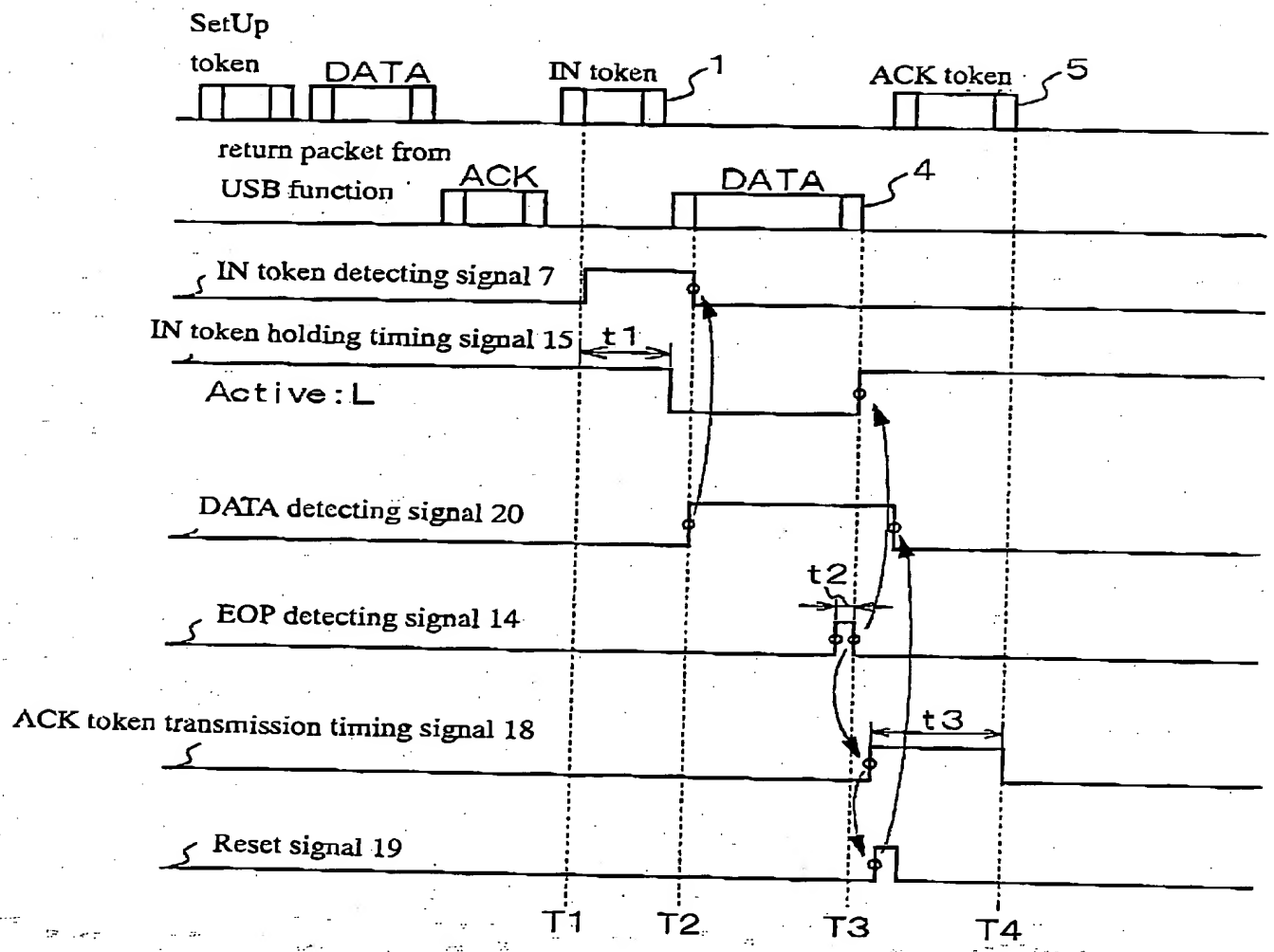

test pattern program
SetUp token
DATA(XXXXX)
In token
OUT token
DATA(NULL)
parallel/serial port
token memory
token transmitter
IN token detector
IN token holder
ACK token transmitter
oscillator
timing controller
EOP detector
packet type judging
shift register
start signal 3
14 : EOP detecting signal
19 : reset signal
18 : IN token transmission timing signal
17 : IN token detecting signal
15 : IN token holding timing signal
21 : ACK token transmission timing signal
11 : NAK detecting signal
12 : STALL detecting signal
20 : DATA detecting signal
USB I/O buffer 5
USB function
G1
G2
G3
2
4
6
16
19
17
8
10
13
9

FIG. 13

FIG. 14


SetUp token
DATA
IN token
1
ACK token
5
return packet from USB function
ACK
DATA
4
IN token detecting signal 7
IN token holding timing signal 15
t1
Active:L
DATA detecting signal 20
t2
EOP detecting signal 14
ACK token transmission timing signal 18
t3
Reset signal 19
T1
T2
T3
T4